REMARKS

REVIEW

The current application sets forth Claims 1-23, of which claims 1, 8, 14, 17, and 20 are independent claim(s). Presently, no claims have been indicated as allowed. Claims 14 through 16 have been cancelled by previous amendment.

Claims 2 and 12 have been objected to for various informalities. Claims 1 through 13, and 17 through 23 have been rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Pat. No. 4,211,111 (*Petroff*) in view of U.S. Pat. No. 5,367,911 (*Jewell et al*).

In this paper, Claims 1, 2, 12, and 17 have been amended. Claims 1 and 17 are amended to correct claim language. No new matter is added by this amendment.

CLAIM OBJECTIONS

Claims 2 and 12 have been amended to correct antecedent basis.

REJECTIONS UNDER 35 U.S.C. 103

Applicants traverse the Office's rejections under § 103(a) with the following comments and amendments.

Description of the Prior Art

1. *Petroff.* *Petroff* discloses a method and apparatus for analyzing inflow and infiltration in a sewer system by measurement of pressures at several locations in the system,

particularly during a rainfall and shortly thereafter, and comparing such measurements to those obtained during dry periods. *See Petroff*, Abstract. The method uses the device revealed in the disclosure, and calls for the measurement of pressure, not volume or velocity, at multiple sewer system access points, or manholes. *See Petroff*, Col. 2, ll. 19-23; Col. 4, 42-4. Pressure measurements are taken by the device disclosed for that purpose in Column 3, line 17 through Column 5, line 14, and are processed by a computer to determine fluid flow in which fluid velocity at the site where the measurement is taken is computed under each of two conditions: either a full or partially full pipe. Col. 5, l. 64 – Col. 6, l. 8. Fluid velocity values (ft/sec) are used to derive flow volumes, or flow rate, in millions of gallons per day. Col. 6, ll. 40-44; Col. 7, ll. 3-5. Differences in flow rate between a rain period (T_2) and its immediately preceding dry period (T_1) are found at each manhole by subtracting a flow rate derived during the dry period at a manhole from the flow rate derived during rain from that same manhole. Col. 7 ll. 25-38 (finding flow differences for each of manhole (70), (72)). Next, the flow rate difference at a downstream manhole (72) is subtracted from the flow rate difference at an upstream manhole (70) which indicates inflow (undesired flow) between the manholes. Col. 7, ll. 38-41. Infiltration (seepage) is found by performing the same analysis, but finding the differences between flow rates at T_2 and after the rain has stopped (T_3). Col. 7, ll. 52-6. The method taught in *Petroff* does not, however, compute or derive a travel time of fluid between measuring points.

2. *Jewell et al. Jewell et al* is directed to a device for measuring fluid behavior, also known as a flowmeter. *See Jewell et al*, Col. 4, l. 35. A prior art flowmeter is also disclosed that includes two sensors that are to be located within a fluid conduit, and displaced some

length along the inside of the conduit. Col. 1, ll. 30-38; Fig. 1. The sensors detect only the presence of the fluid as it travels along the conduit, and each generates an output signal. Col. 1, ll. 38-47; Col. 4, ll. 51-8 ("The sensors thus detect the fluid"); Col. 5, ll. 36-43. The data signals are provided to a processor in which they are cross-correlated. *Id.* at ll. 48-58. It should be noted that neither of the two sensors measures velocity or volume of the moving fluid; simply a physical property to which the sensor responds. The sensors are simple detectors, either acoustically or electrically triggered. Col. 5, ll. 36-43 (describing sensors detecting the conductivity or resistivity of the fluid); Col. 11, ll. 10-34 (describing use of acoustic sensors). Therefore, one sensor does not collect data representative of velocity at its location. The device taught in *Jewell et al* requires both sensors to collect velocity data. The output signal from a single sensor only indicates only the presence of the fluid, but it does not by itself, represent velocity, and as such, is not "data representative of velocity."

The cross-correlation step determines the time delay between the two sensor output signals, and from this data, fluid velocity is derived. *See Jewell et al*, Col. 2, ll. 53-57. The cross-correlation technique simply multiplies the first signal by a time-shifted version of the second signal. *See id.*, Col. 2, ll. 37-41. When the time shift matches the actual time delay, a product maximum value is observed. *See id.*, ll. 48-57. Accordingly, *Jewell et al* only teaches collecting velocity data at single location where that location is defined by the two sensors. It does not teach the collecting of velocity data, or data representative of velocity, at more than one location. It does not analyze flow volumes over an entire sewer network, and it does not provide an indication of undesired flows within such a network.

Application of the Cited Art to the Claims

The combination of *Petroff*, and *Jewell et al*, is improper and thus, fails to establish a prima facie case of obviousness. In properly rejecting claims under § 103(a), Examiner must establish a prima facie case of obviousness, and in doing so the Examiner must meet three criteria. First, there must be some suggestion or motivation, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *See* MPEP § 706.02(j). Second, there must be a reasonable expectation of success. *Id.* Finally, the prior art reference (or references, when combined) must teach or suggest all of the claim limitations. *Id. See also,* MPEP § 2142; 2143.[1]

The Office bears the burden of establishing a prima facie case of unpatentability. *See In re* Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). A legally cognizable prima facie case of unpatentability is established only upon the adducement of reasoning supported by evidence.

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1 § 2143 of the MPEP provides:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.
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> The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Long-settled legal principle establishes that an examiner fails the initial burden when he or she fails to provide a factual basis for conclusions rendered in the action. The law is abundantly clear:

> The Supreme Court... foreclosed the use of substitutes for facts in determining obviousness under section 103. The legal conclusion of obviousness *must be supported by facts.* Where the legal conclusion is not supported by facts it cannot stand.
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> The Patent Office has the initial duty of supplying the factual basis for its rejection. It may not, because it may doubt that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis. To the extent the Patent Office rulings are so supported, there is no basis for resolving doubts against their correctness. Likewise, we may not resolve doubts in favor of the Patent Office determination when there are deficiencies in the record as to the necessary factual bases supporting its legal conclusion . . .

In re Warner 379 F.2d. 1011, 1017, 154 USPQ 173, 178 (C.C.P.A. 1967)(emphasis supplied).

These principles have not been followed in rejecting the claims. Specifically, the Detailed Action misinterprets the teachings of *Jewell et al* in proposing the combination of *Petroff* in view of *Jewell et al* renders the claimed invention obvious. As a result, a prima facie case of obviousness has not been established because the combination fails to teach every element recited in the claims.

1. Claims 1 through 7. The Office Action concedes that *Petroff* fails to teach "determining, by a processor, a travel time corresponding to the time it takes for the substance to travel between the first location and the second location, using the first [velocity] data [from a first location], the second [velocity] data [from a second location], and a constant," but proposes that *Jewell et al* teaches this element. Detailed Action, at p. 4. However, as noted above, *Jewell et al* only discloses a flowmeter that measures velocity over a distance defined by the separation between two sensors. Therefore, it does not teach using two sets of data, each representative of velocity, and each from a different location. Indeed, *Jewell et al* only teaches determining a travel time and then deriving a velocity between to points defined by the relative positions of the sensors, not first collecting velocities and then determining travel time as is required by the claim.

Respectfully, the sections of *Jewell et al* cited in the Detailed Action do not stand for the concepts suggested. For example, the Detailed Action cites *Jewell et al* at Figure 1, which simply depicts the two sensors displaced by some length and coupled to a processor. This in itself does not disclose collecting two sets of data, each representative of velocity, at two different locations. The remaining sections of the specification cited in the Action all deal with the cross-correlation technique executed in the processor.[2] Moreover, the specification

2 Citations to *Jewell et al* provided in the Detailed Action (page 4) to justify the rejection of Claim 1 are as follows. Claim 7 recites "Apparatus according to claim 1, further comprising a cross-correlation signal processor to which information indicative of output signals from at least two of said sensors is conveyed and which compares and correlates said information."; Col. 5, ll. 15-20 provides: "The relative time-displacement between data output signals may be effected, in the cross-correlation process, in either sense, that is, both positive and negative, corresponding to fluid flow either upwardly or downwardly in the borehole 32. A case of zero net flow along the distance L may be confirmed by observing the time record of a single sample volume. Where the time variation of the signal at a sensor does not significantly change over an extended period of time, relatively speaking, it may be concluded that the lack of activity is an indication of zero net fluid flow." Col. 7, ll. 1-7: "For example, any two of the current-sensing electrodes 76 may be utilized to obtain output signals which are then cross-correlated to determine the time for fluid

expressly provides that the output signals generated from the sensors indicate only some property of the fluid, and are both required to derive fluid velocity. Therefore, in *Jewell et al* velocity data can only be collected in the limited location defined by the two sensors.

The Detailed Action does not provide the requisite evidence necessary to secure the prima facie case. Specifically, the Detailed Action cites to *Jewell et al*, but does not satisfactorily explain how the elements of Claim 1 are disclosed in *Jewell et al* as is required by applicable law. The plain language in Independent Claim 1 recites the use of velocity data acquired at two different locations in a network to derive a travel time. *Jewell et al* on the other hand uses travel time between two sensors to derive velocity of a fluid traveling the distance between the sensors. Consequently, the combination of *Petroff* in view of *Jewell et al* does not teach all of the limitations claimed in Claim 1. Applicants submit that, for at least these reasons, Claim 1 and its dependent claims are therefore patentable.

To interpret *Jewell et al* as the Detailed Action proposes would require that the first sensor determines velocity at its location, and the second sensor determines velocity at its location, and then travel time is derived from these two velocities, which is not what *Jewell et al* expressly teaches. This is completely contrary to the way the device disclosed in *Jewell et al*

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to flow along the body 72 a distance equal to the separation between the selected current-sensing electrodes. Thus, a spacing L and focus width H may be determined for the two selected electrodes 76. The spacing L may be varied by varying the selection of current-sensing electrodes 76."; Col. 7, ll. 58-61: "another pair of current-sensing electrodes 76 may be formed by cross-correlating their respective output signals for another flow velocity determination."; Col. 11, ll. 50-7: "Thus, each of the two axially spaced acoustic transducers 174 and 176 provides an output signal which is indicative of the medium at the level of the sensor when the signal is formed. Thus, the output signals from the two acoustic sensors 174 and 176 may be cross-correlated to determine the time required for the fluid medium to move between the position of one of the sensors and the other."; Col. 12, ll. 56-64: "The sensors may be arranged in various configurations to analyze and quantitatively measure movement of the fluid about the flowmeter and within the surrounding conduit wall. Two sensors provide the necessary measurement for the flowmeter to determine the medium flow speed. Output signals from the sensors may be cross-correlated for accurate determination of time intervals measured to determine the speed of fluid movement and the direction of the flow." Obviously, these cited sections do not teach the collection of two velocity data sets at different locations.

operates. Neither sensor by itself collects data representative of velocity. The sensors in *Jewell et al* detect only the presence or movement, electrically or acoustically, of the fluid with which the sensors are in contact. The flowmeter apparatus described in *Jewell et al* requires both output signals, which by themselves contain no velocity data, to derive a travel time. The output signals are not data that is representative of flow velocity. Moreover, it is from this travel time calculation that velocity is determined between the two sensors.

2. Claims 8 through 13. With respect to Claim 8, the Detailed Action concedes that *Petroff* does not teach a "processor is programmed to derive a travel time of a flow from the first location to the second location using the first flow velocity, the second flow velocity, and a constant." As discussed above with respect to Claim 1, neither does *Jewell et al*, contrary to what the Action proposes. The processor in *Jewell et al* is programmed only to cross-correlate two output signals indicative of movement of a fluid in a conduit, and derive a travel time between two sensors from which a fluid velocity is derived. In contrast, the plain language of Claim 8 requires the use of two velocity measurements to derive travel time. Therefore, not all of the limitations recited in Claim 8 are taught by the combination suggested in the Detailed Action. For at least these reasons, Applicants submit that Claim 8 and its dependent claims are patentable over *Petroff* in view of *Jewell et al.*

3. Claims 17 through 19. With respect to Claim 17, the Detailed Action concedes that *Petroff* does not teach "identifying a first distribution of the first set of flow volume data over time; identifying a second distribution of the second set of flow volume data over time; identifying a constant corresponding to a relation of the first distribution and the second distribution; determining a transport time corresponding to a transport of a substance from

the first location using the first flow velocity, the second flow velocity, and the constant, wherein the determining step does not require additional data." Detailed Action, pg. 7. Further, the Detailed Action suggests that those skilled in the art would apply *Jewell et al* to find these missing elements. *See Id.*, p. 8. As shown above with respect to Claim 1, *Jewell et al* does not disclose using a first velocity measured at a first location, and a second velocity measured at a second location to derive a travel time. On the contrary, *Jewell et al* only teaches finding a travel time of fluid at a single location defined between two sensors, and then deriving velocity from the travel time. Accordingly, prima facie obviousness is not established in light of the combination of *Petroff* and *Jewell et al* with respect to Claim 17 and its dependent claims because the combination proposed does not teach all of the limitations of Claim 17.

4. *Claims 20 through 23.* The Detailed Action concedes that *Petroff* does not teach "determining a transport time corresponding to transport of a substance from the upstream location to the downstream location using the first flow velocity, the second flow velocity, and the constant, wherein the determining step does not require additional data." As shown above with respect to Claim 1, *Jewell et al* does not teach this required element either. Therefore, the combination proposed by the Office does not teach all of the elements of Independent Claim 20. As a result, there is no prima facie case of obviousness with respect to Claim 20 or its dependent claims.

Since the Detailed Action does not establish a prima facie case of obviousness, Applicants submit that the claims are entitled to an allowance and requests withdrawal of the current rejections.

CONCLUSION

In view of the foregoing comments, Applicants respectfully request withdrawal of the current grounds of rejection and objection, and the issuance of a formal Notice of Allowance. The Examiner is invited to telephone the undersigned at his convenience should only minor issues remain after consideration of this amendment in order to permit early resolution of the same.

Respectfully submitted,

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